

dati dentato-repandis glabris, petiolis asperis, pedunculis filiformibus, floribus nutantibus, calcare brevissimo. *G. Don, Syst. Gard. i. p. 334.*—*Viola Sieberiana, Spreng. Syst. Veg. App. p. 68.*

New Zealand (Northern Island). Among fern, near the Mission House on the Keri-Keri river, Bay of Islands.—1833, *R. Cunningham.*

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Principles of General and Comparative Physiology, intended as an introduction to the study of Human Physiology, and as a Guide to the Philosophical Pursuit of Natural History. By William B. Carpenter, M.R.C.S., late President of the Royal Medical and Royal Physical Societies of Edinburgh, &c. &c. With 240 Figures on Copper and Wood. London, 1839.

Few errors in the mode of pursuing science are more common than to commence the study of some particular branch without that preliminary knowledge which is most likely to render it interesting and profitable. This is especially the case in the sciences of natural history and physiology. How frequently we observe young persons zealously devoting themselves to some department of botany,—the collection of the Phanerogamia of Great Britain for example,—without thinking it worth while to make themselves acquainted with aught beyond their simple external characters, and thus losing the pleasure which the contemplation of the structure of these plants, and of the analogies of their organs with those of the Cryptogamia on the one hand and of animals on the other, cannot fail to afford to those who properly seek for it, besides foregoing many opportunities of contributing something to the common stock of knowledge! Scarcely less common is it to meet with those who imagine themselves to be diligent zoologists, when their endeavours are solely directed to the acquisition of the most complete collection of shells, of whose inhabitants they know nothing, or of the most perfect series of butterflies or beetles, whose wonderful transformations and beautiful internal structure are regarded by them with indifference. The mere collector has little idea how much enjoyment he loses by not carrying his inquiries further, that is to say, if he have a soul capable of such enjoyment, and not entirely engrossed with the *amor habendi*. Even among those who possess a truly scientific knowledge of individual branches of natural history it is but too common to discover but a superficial acquaintance with others, such

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The object of the volume before us is to supply the means of attaining such knowledge within moderate limits; and, by presenting a comprehensive survey of the whole organized creation, to afford the best preparation for the successful pursuit of any line of inquiry that may suit the taste and opportunities of the student of nature. The author has not contented himself with a superficial view, however, as from its brevity it might be supposed to be, but has endeavoured to introduce his readers to the highest departments of physiology and natural history, by a simple exposition of such general laws as have been discovered to preside over their varied phænomena, and, by a judicious selection of facts, to make the application of these laws and the path to be followed in search of others fully intelligible. Among the leading features of the work are the rank given to vegetable physiology, and the original manner in which this subject is treated. We are not acquainted with any treatise on this department of science in which the Cryptogamia receive a due share of attention. By British writers they have been especially neglected, the structure and functions of the flowering plants alone being treated of in any detail. In this work, however, we find not only a general survey of the whole vegetable kingdom, in which its principal natural groups are all delineated on the same scale, but a detailed view of each system of organs, which is traced from its first appearance in the lower members of the series up to its perfect evolution in the highest. We are thus led to perceive the gradual *specialization* of each function by the restriction of it to some portion of the organism particularly adapted to perform it, and this is shown to take place also during the evolution of the embryo of any one of the highest tribes of vegetables. We believe then that Mr. Carpenter may fairly claim the credit of having applied to the vegetable kingdom the general law based by Von Baer upon his examination of the animal world, that, both in the ascending scale of creation and in the development of any single being, "a heterogeneous or special structure arises out of one more homogeneous or general, and this by a gradual change." We shall illustrate this position by giving an abridgement of the section which treats of the absorbent system in plants, and this will afford us an opportunity of explaining another

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law, propounded by our author himself, which may be regarded as a sort of corollary to the former.

In the lowest cellular plants every part of the surface appears equally concerned in the function of absorption. This is most evident in those simple protophytes usually classed among the *Algæ*, which consist of an aggregation of insulated vesicles, each of which may almost be regarded as a distinct individual. Thus the surface of one of the cells of the *Protococcus nivalis* may be regarded as *all root*. In the higher genera of this group the separate vesicles no longer maintain their individuality, but form part of one definite structure. Still the whole surface appears to be endowed with the power of absorption in nearly an equal degree; and though the semblance of a stem and roots occasionally presents itself, these appear to have no other function than to give attachment to the frondose expansion. There is no transmission of fluid from one part to another, each cell deriving from the surrounding medium, or from the surcharged cells in its immediate neighbourhood, the fluid essential to its existence. It is in the Lichens that we find the first specialization of the absorbent function, by the restriction of it to the side least exposed to the sun and air, whilst the reproductive function, which in the *Algæ* was common to nearly the whole frond, is here confined to the other surface. In some lichens we find radical filaments developed from the absorbent surface, the first indication of special organs for the purpose. In the Fungi the separation between the nutrient and reproductive organs is generally still more complete, and in the highest groups of this order a stem with very definite roots is developed. These are yet more complete in the mosses, but still nutrition may be performed by the general surface independently of them. And even where these filamentous processes of the Cryptogamia bear the greatest resemblance to roots, there is reason to believe that they absorb by their whole surface, and not by their points alone. In the vascular plants we find the function of absorption attaining its highest degree of specialization, being as it were concentrated in the growing points of the roots, which are known as the *spongioles*, and the function is more actively performed by them in proportion to the small amount of surface they expose.

Still, however, it is found that the general surface, even of a vascular plant, is concerned in this function, and that in many instances it is even capable of entirely performing it when the roots are from any cause unable to act. This is a very beautiful example of the second law to which we have alluded, and which we shall state in the author's words. "In cases where the different functions

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are highly specialized, the general structure retains, more or less, the primitive community of function which originally characterized it." We have seen that in the simplest or most homogeneous beings the entire surface participates equally in the function of absorption, and we now perceive that even in the highest and most heterogeneous, where the number of distinct organs is greatest and their respective functions most completely restricted to them, some traces of this primitive community remain. We shall conclude our illustration by quoting the account given by Mr. Carpenter of the development of the same system in the embryo of a vascular plant, in which he ingeniously shows its conformity to the same laws. "In tracing the gradual evolution of the special absorbent system of the more perfect plants, we may observe many interesting relations between the progressive stages of its development and the permanent forms of the system in the lower orders. Thus the embryo at its first appearance within the ovule is nothing but a single cell, like that of the *Proto-coccus*, in the midst of the store of semi-fluid nutriment prepared by its parent, which it gradually absorbs by its whole surface, just as do the simplest cellular plants. At the time of the ripening of the seed we mark the rudiment of the future root, which is developed during germination; but in the early stages of this process the radicle simply prolongs itself into the ground, and appears to be equally capable of imbibing moisture through its whole length, like that of the fungi or mosses. It is not until the true leaves are evolved that the root begins to extend itself by ramification, then first protruding perfect fibrils composed of woody fibre and vessels and terminated by spongioles."

We need scarcely point out the additional interest which is given to the *facts* of science when they thus become subservient to the establishment of those generalizations in which true science consists. Again, to quote our author's language, "At every successive step we are led to comprehend new relations between facts that previously seemed confused and insulated; new objects for what at first seemed destitute of utility; and in the same proportion will the contemplative spirit be led to appreciate the vastness of that Designing Mind, which, in originally ordaining the laws of the animated world, could produce such harmony and adaptation amongst their innumerable results."

Having thus endeavoured to communicate to our readers an idea of the objects and spirit of this treatise, we shall briefly indicate its contents. It is divided into two books, the first of which is devoted to general physiology, the second to special physiology. These,

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Having thus endeavoured to communicate to our readers an idea of the objects and spirit of this treatise, we shall briefly indicate its contents. It is divided into two books, the first of which is devoted to general physiology, the second to special physiology. These,

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however, are preceded by an introduction of considerable length, designed to present to those who stand in need of such preliminary information a general view of the organized creation. The characteristics of organized structures are first pointed out, and the elementary tissues of plants and animals described. Here will be found various novel and interesting analogies, especially in regard to the variations which the type of the *spiral vessel* presents. An outline view is then given of the characters of each of the principal groups of the vegetable and animal kingdoms, in which the links of transition and their respective analogies are specially pointed out.

Under the head of General Physiology are discussed the nature and causes of vital actions; the dependence of life upon external stimuli; heat, light, electricity, &c.; and the laws of organic development. These are succeeded by a connected view of the functions performed by organized beings, in which their mutual relations are shown, and the distinctions between plants and animals definitely pointed out.

In the second book, comprising Special Physiology, each function is considered in detail. The evolution of its particular organ in the ascending scale of being is described, first as regards the vegetable kingdom (in the manner we have already instanced), and then the animal kingdom, and its correspondence with the development of the same organs in the embryo of higher beings is displayed. Under this head are introduced explanations of various interesting malformations or *monstrosities* which result from arrest of development; these are most frequently presented in the circulating system of animals.

The advantage which the physiologist derives from bringing into comparison the facts derived from an extensive variety of sources is perhaps nowhere more evident than in regard to the reproductive system of vegetables. It has been so much the habit of botanists to *separate* instead of *approximating*, that analogies are often obscured by the multiplication of terms; so that the inexperienced cryptogamist is bewildered by the different appellations which the same organs receive in distinct groups and by the want of any indication of their similarity beyond what he may discover by his own inquiries. Mr. Carpenter appears to us to have extremely simplified this difficult subject by showing the fundamental correspondence between the reproductive organs in all the tribes of Cryptogamia, and he has brought forward strong evidence to show that this may be traced even into the Phanerogamia, which differ from the others only in the addition of new organs, and not in the alteration of the character of the original ones. Without pronouncing a decided opinion upon this

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After what we have said of the character of this work it is almost needless to add our strong recommendation of it to our readers as one which can scarcely fail to be of service to them, in whatever department of natural history they may be engaged. Although specially designed for the medical student the author has taken much pains to adapt it to the general reader, and we trust that he may meet with his reward in the advancement of that philosophical spirit of inquiry which it is his aim to promote.

Memoirs of the Wernerian Natural History Society for the Years 1837-38. Part I. Vol. VIII. 8vo. 1839.

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I. "Observations on the Distinctions, History, and Hunting of Seals in the Shetland Islands." By Lawrence Edmonstone, M.D. Dr. Edmonstone is of opinion that two species only frequent and are permanent natives of the Shetland isles, which he places under the names of *Phoca vitulina* and *barbata*; the supposed existence of any other large seal being perhaps attributable to the great difference in form between the males and females of his *P. barbata* or Half-fish. A

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